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The College of Mechanical and Electrical Engineering

STATE UNIVERSITY OF KENTUCKY :: :: :: LEXINGTON

Mechanical Hall
State University
of Kentucky

Offering a University Course in Dynamic Engineering


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COLLEGE OF
MECHANICAL AND ELECTRICAL ENGINEERING
STATE UNIVERSITY OF KENTUCKY
CLASS OF 1909
C.J. ABLOW
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State University of Kentucky

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Instructor in Electrical Engineering

JESSE VERNON BAXTER,
Engineer and Assistant in Wood Shop

A PRACTICAL EDUCATION

THE TRAINING OF MECHANICAL AND ELECTRICAL ENGINEERS IN KENTUCKY

THE successful man of today is one who has an education that has a market value. This applies to all classes of men. The writer, the lawyer, the surgeon, the merchant, or the engineer can measure his value to the world largely by what men are willing to pay for his services. The conception of an education has been greatly modified in recent years. A man is educated who is skilled in doing some useful thing; who manifests an interest in all men engaged in useful work; who is always striving to be more skillful and better informed in his own work. The beauties of art, literature and philosophy do not belong to any class of men. The man who is engaged in productive work should find first that culture that comes from doing his work well, but his happiness and breadth of life will be increased if he finds some of the gems in the world of literature and art.

The technical school is responsible to a large degree for the present status of the science of engineering. Machines today are built by men well versed in the refinements of mechanical engineering. The great industries of this country are continually looking for young men who have a scientific training in the art of machine designing and power transmission. The steam engine presents each year new possibilities, and the evolution in this direction has recently taken shape in the steam turbine. The gas engine is being more widely applied than ever before. The recent development of available water power, and the growth of the interurban railway lines have made new fields of endeavor for the highly trained mechanical engineer.

Kentucky has not been slow to recognize the fact that she must provide for her sons a great school in mechanical and electrical engineering, in order to equip them for a work that offers large opportunities in this age of industrial achievements. For fifteen years the State University of Kentucky has been sending her mechanical and electrical engineers to all parts of the country where they have achieved great distinction with the largest machine, engine and electrical apparatus building concerns. Kentucky boys have made such a record that there is a demand for State University of Kentucky mechanical and electrical engineers that can not be supplied. In the class of 1906 there were thirty men and there were over one hundred applications for these graduates. There were eleven applicants for State University men to take up teaching work in mechani-

Scenes on State University of Kentucky Campus

cal and electrical engineering in some of the best known universities in this country. The class of 1907 all secured good positions and all of the thirty-three 1908 graduates, notwithstanding the business depression, found employment in good engineering positions. The members of 1909 class have been sought by the engineering concerns and universities having mechanical and electrical engineering courses.

No other state in the Union makes such liberal concessions to her young men to gain an education as does Kentucky. A county appointed student not only gets his tuition, matriculation fees and room rent free, but the legislature has actually provided that he receive his traveling expenses from his home to the college and return. The expenses for any resident of the state, whether he be appointed or not, are reduced to a minimum. Every young Kentuckian should recognize that the state has put at his command the means of obtaining an education in mechanical and electrical engineering that is second to none. He should further appreciate the fact that the state is making provisions that would cost each student at least two hundred dollars a year for tuition should all the expenses of his training be gotten in a school not supported by state or federal aid.

MECHANICAL AND ELECTRICAL ENGINEERING BUILDING AND EQUIPMENT

Mechanical Hall is the home of the College of Mechanical and Electrical Engineering. It contains thirty thousand square feet of floor area and is admirably adapted for all recitation, lecture, drawing and laboratory work.

The equipment of the department is described briefly as follows: The drawing rooms contain drawing tables and boards to accommodate about one hundred students.

Power is supplied to the shops by a 10-inch by 24-inch Hamilton-Corliss non-condensing engine.

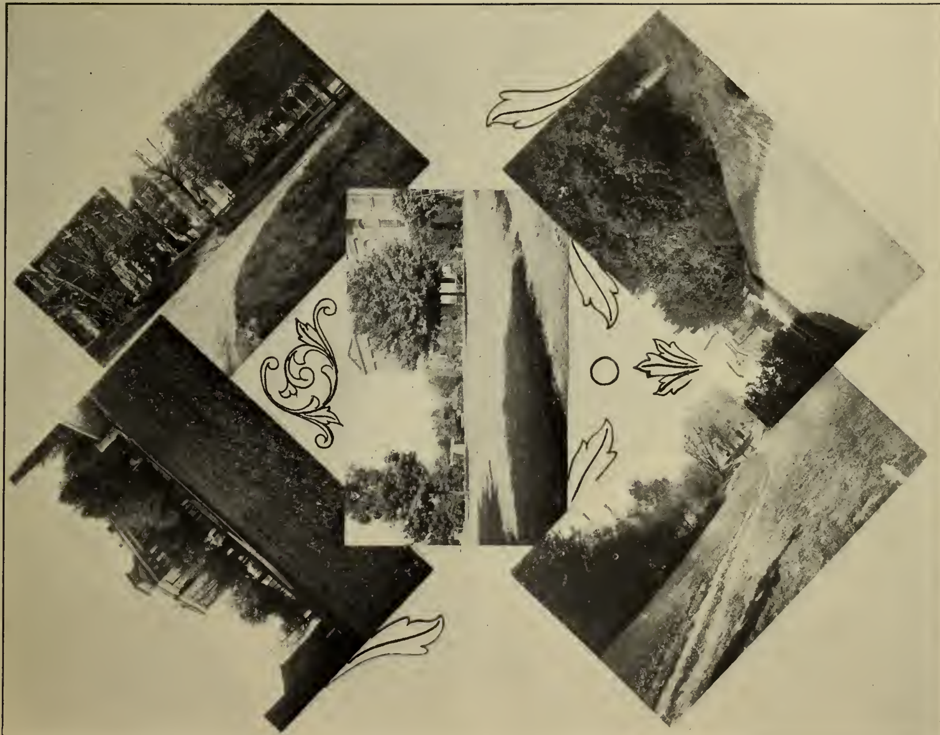
The wood shop contains thirty benches, each with a complete set of bench tools; and twenty-two lathes, each with a complete set of wood-turning tools. Besides these, there are a band saw, a jig saw, two circular saws, a trimmer and a grindstone.

The foundry contains a 30-inch cupola furnace, having a capacity of a ton of metal per hour, a brass furnace, twelve complete sets of moulder's tools, twelve benches, besides the ladles, flasks, clamps, core oven, pattern rack, and other equipment such as is used in practical foundry operation.

The blacksmith shop is equipped with fifteen down-draft forges. With each forge there is a set of blacksmith tools. A power hammer is available for heavy work.

The machine shop contains seven lathes, two milling machines, one planer, one shaper, two drilling machines, one dry emery grinder, one wet emery grinder, one universal grinding machine, two sensitive drills, twelve vises for bench work in metal, an air compressor, some pneumatic tools, and a small punch and shear.

The tool room is equipped with a varied assortment of such tools and supplies as are used in the shops. In con-



On the Campus, State University of Kentucky

nection with the shops there is a wash-room containing lockers for the accommodations of the students.

There are two separate boiler-houses. One contains a 50-horse-power Babcock and Wilcox boiler and a No. 3 Dean pump. The boiler is used for heating and to supply steam to the Hamilton-Corliss engine, which furnishes power to the shops. The other boiler-house is situated close to the steam laboratory, and a 100-horse-power Babcock and Wilcox boiler has just been installed. This boiler can furnish steam at 200 pounds pressure, and an elaborate equipment for boiler testing has been installed, including induced draft apparatus, barrels and scales for weighing water, and devices for burning oil and gas, as well as coal.

The steam engineering laboratory is equipped with indicators, planimeters, gauges, pyrometers, reducing motion apparatus, scales, micrometers, tachometers, etc. It contains a 40-horse-power Houston, Stanwood and Gamble cross-compound throttling engine, a 10-horse-power Corliss engine, a 25-horse-power Buffalo Forge engine, a 35-horse-power Westinghouse single-acting compound engine, a small slide-valve engine for elementary experimental work in valve setting, a small engine with a Stephenson valve gear, and a 10-horse-power De Laval turbine. There are also two 4-horse-power Fairbanks-Morse gasoline engines with gas attachments, and the necessary auxiliary apparatus for testing.

The addition of an experimental laboratory has recently been completed. One room contains all the testing machines for testing materials of engineering; another contains photometric apparatus, telephone laboratory, and appliances for electrical measurements and testing; the third room contains a 150-horse-power Buffalo Forge tandem compound engine; 200-horse-power Wheeler condenser, which is so arranged that all engines in the main laboratory can be operated condensing. A testing plate has been arranged for bolting down engines and generators for commercial testing; an automobile testing plant has been installed which will take care of the largest automobile built, allowing the same to be run at the maximum speed and power.

The attention that will be paid to automobile engineering in the future is an important element of development.

For work in testing materials of construction there is a 100,000 pound Riehle resting machine, and a Fairbanks-Morse cement-testing equipment. A 200,000 pounds Olsen machine is being installed.

For the experimental engineering work in electrical engineering there are a 10 kw., d.c. Edison dynamo, a 9 kw. d. c. motor, a 2-horse-power General Electric induction motor, a 1.5 kw. polyphase dynamo, a Wagner induction motor, d. c. generator set furnishing 3 kw., a potentiometer, a photometer, and several galvanometers, Wheatstone bridges, and other apparatus of the same general character.

There is quite an extensive equipment for pursuing the study of telephony, consisting of a small switchboard containing jacks and drops for both common battery and magneto circuits, built by the American Telephone Company. Then there are a number of subscribers' instruments,

Library State University of Kentucky

some of the American Telephone Company's make, some of the Kellogg Company's, and some of the Western Electric Company's. This equipment is sufficient to enable the students to obtain a comprehensive grasp of some of the advanced problems of telephony.

The aim of the College of Mechanical and Electrical Engineering, as a part of the State University, will be primarily to train young men to be competent to take up the work usually assigned to graduates of engineering schools, either in mechanical or electrical engineering. In addition to this, as opportunity offers, it is expected that students will engage in advanced scientific research pertaining to all the branches of mechanical, electrical and chemical engineering.

COURSE OF STUDY

The practical work extends over a period of two years, and includes the experience in the wood shop, machine shop foundry, and forge shop. During this period the classroom work and drawing are preparatory to the theoretical studies taken up during the third and fourth years. The course in Mechanical Engineering, as administered at the State University of Kentucky, may be considered as being divided into three parts, as follows:

1. **Mechanical Engineering Proper.** Under this heading come the studies of steam engineering practice, the operation and design of gas engines and producers, and the operation and design of manufacturing machinery.

2. **Chemical Engineering.** This is intended especially for those who will engage in the production of iron and steel, and involves study of the various methods of analysis of iron, steel, coals, fluxes, and refractory substances.

3. **Electrical Engineering.** This involves the study of the design and operation of electrical apparatus and machinery.

The foregoing is a general classification. Each of the subjects mentioned permits of further subdivision to suit the needs of the student.

DEGREES

The courses of study in Mechanical and Electrical Engineering all lead to the degree of B. M. E. [Bachelor of Mechanical Engineering]. The advanced degree, M. E. [Mechanical Engineer], or E. E. [Electrical Engineer], may be obtained by a resident student in one year after taking the degree B. M. E. from the State University of Kentucky, or any institution of equal requirements, provided he has done the work assigned him satisfactorily, passed his examination, and presented an acceptable thesis.

A non-resident student may obtain the degree of M. E. three years after graduation, if he has been engaged in practical engineering work during that time, passes an examination, and presents an acceptable thesis. At least two years' notice must be given to the Faculty that postgraduate work is to be done, and the work must be approved by the Faculty.

The Dormitories, State University of Kentucky

Machine Shop Annex

Foundry

Wood Shop

Forge Shop

Corner in Machine Shop

Switch Board Electrical Laboratory

Machine Shop

Experimental Laboratory Steam and Electrical

FRESHMAN YEAR

1. **Technical Instruction.** Thirty-five weeks, one hour per week. [a] Recitation on the forms of wood-working tools and the cutting and peculiarities of timber. [b] Lectures on the operation of the various forms of wood-working machinery. [c] Lectures on pattern-making, molding and casting.

2. **Mechanical and Free-Hand Drawing.** Thirty-five weeks, seven and a half hours per week. [a] This drawing includes free-hand sketches, drawing from copies and models, using parts of machines in the Mechanical Laboratories as models. [b] Free-hand lettering. [c] Exercises in tinting and shading. [d] Tracing. [e] Blue-printing.

3. **Shop-Work.** Thirty-five weeks, eleven and a half hours per week. [a] Bench-work in wood, including exercises in the following operations: planing, sawing, rabbeting, plowing, notching, splicing, mortising, tenoning, dovetailing, framing, paneling, and the general use of carpenters' tools. [b] Wood-turning, involving the various principles of lathe-work in wood. [c] Pattern-making, which gives the student experience in the construction of patterns for foundry work. [d] Foundry work, including the various operations of molding, core-making and the melting of iron and brass.

4. **English.** Thirty-five weeks, three hours per week.

5. **College Algebra.** Twenty weeks, five hours per week.

6. **Trigonometry.** Fifteen weeks, five hours per week.

7. **Physics.** Fifteen weeks, two hours per week; twenty weeks, three hours per week.

8. **Chemistry.** Fifteen weeks, three hours per week twenty weeks, two hours per week.

SOPHOMORE YEAR

1. **Mechanical Drawing.** Fifteen weeks, eight hours per week. [a] Drawing the parts of machines and complete machines to scale. [b] Isometric and Descriptive Geometry problems. [c] Design of machine details.

2. **Shop-Work.** Thirty-one weeks, ten hours per week. [a] Exercises in iron and steel forging. [b] Exercises in vise-work in metal. [c] General machine work; including screw cutting, drilling, planing, and the milling of iron, brass, and steel.

3. **Shop Practice.** Fifteen weeks, two hours per week.

4. **Descriptive Geometry.** Twenty weeks, eight hour per week.

5. **Physical Laboratory.** Fifteen weeks, five hours per week.

6. **Advanced Physics.** Fifteen weeks, three hours per week.

7. **Analytical Geometry.** Thirty-five weeks, five hours per week.

8. **Surveying.** Twenty weeks, two hours per week.

9. **Calculus.** Twenty weeks, five hours per week.

10. **Electricity and Mangnetism.** Twenty weeks, three hours per week.

11. **Field Work in Surveying.** Four weeks, ten hours per week.

The Main Building, State University of Kentucky

Experimental Laboratory Steam and Electrical

JUNIOR YEAR

1. **Kinematics.** Fifteen weeks, five hours per week. Under this head are studied the velocity ratios in various motions, constructed of gears, cams, quick-return motions, and the manner of designing trains of mechanism.

2. **Mechanical Drawing.** Fifteen weeks, nine hours per week; ten weeks, ten hours per week, and ten weeks, eight hours per week. The work consists of Kinematic Drawing, including spur, bevel, worm and spiral gearing: Design of shop machines, such as lathes, planers, shapers, drills, etc., including an original design by each student of some shop machine complete, with all detail drawings.

3. **Analytical Mechanics.** Twenty weeks, five hours per week.

4. **Strength of Materials.** Fifteen weeks, five hours per week.

5. **Elements of Electrical Engineering.** Fifteen weeks, five hours per week.

6. **Graphic Statics.** Ten weeks, five hours per week.

7. **Calculus.** Fifteen weeks, five hours per week.

8. **Electrodynamic Machinery.** Ten weeks, five hours per week.

9. **Theory of Machine Design.** Five weeks, five hours per week.

10. **Dynamo and Motor Design.** Ten weeks, five hours per week.

11. **Electrical Design.** Ten weeks, five hours per week, and five weeks, five hours per week.

Director's Office

Junior Designing Room

12. **Electrical Laboratory.** Ten weeks, two hours per week.

13. **Chemistry and Gas Analysis.** Ten weeks, five hours per week.

14. **Flue Gas Analysis.** Ten weeks, three hours per week.

15. **Chemical Laboratory.** Fifteen weeks, four hours per week.

16. **Testing of Materials Laboratory.** Fifteen weeks, one hour per week.

17. **Metallurgy.** Ten weeks, two hours per week.

SENIOR YEAR

1. **Thermodynamics.** Fifteen weeks, three hours per week. This work consists of a study of the laws of thermodynamics, thermal capacities, and the application of thermodynamics to the steam engine, steam turbine, and gas engine.

2. **Steam Boilers.** Fifteen weeks, two hours per week. A study of the various commercial steam boilers, consumption of fuel, incrustations, determining the horse power of boilers, boiler tests, the design of boilers for efficiency and economy, and the methods of heat transmission.

3. **Valve Gearing.** Fifteen weeks, three hours per week. The study of various forms of standard engine valves and methods of designing.

4. **Hydraulics.** Fifteen weeks, two hours per week.

5. **Alternating Currents; Dynamo and Motor Design.** Fifteen weeks, five hours per week.

6. **Electrical Laboratory.** Twenty-five weeks, three hours per week.

Senior Room

7. **Alternating Currents and Power Plants.** Ten weeks, five hours per week.

8. **Logic.** Twenty-five weeks, two hours per week.

9. **History.** Twenty-five weeks, three hours per week.

10. **Dynamometers and Measurement of Power.** Ten weeks, two hours per week.

11. **Steam Turbines.** Ten weeks, three hours per week.

12. **Valve Gear Design.** Ten weeks, eight hours per week, and five weeks, five hours per week. This consists in working out valve gear problems.

13. **Engine and Machine Designing.** Fifteen weeks, five hours per week. A study of the modern methods of designing engines, boilers, and machines.

14. **Experimental Engineering.** Twenty-five weeks, six hours per week. This includes a study of the steam engine indicator, making engine, boiler and materials for construction tests, and experimental engineering work in electrical engineering.

15. **Theory and Practice of Photography.** Ten weeks, five hours per week.

16. **Electrical Design.** Twenty-five weeks, three hours per week. This consists of drawing-room work, Saturday mornings.

17. **Thesis Work.** Ten weeks, forty hours per week. Every student, before he attains the degree of B. M. E., must present a satisfactory thesis on some new design of a machine or an original investigation. The greater part of the third term of the Senior year is given to the preparation of this thesis. The subjects for theses are assigned to students by the Dean of the Mechanical and Electrical Engineering Faculty, and the completed theses are kept on file with the college records, that they may serve as a reference for future investigators.

JUNIOR AND SENIOR INSPECTION TRIP

Annual trips, for the purpose of inspecting manufacturing and power plants, are taken by the Junior and Senior classes. The Juniors, for several years, have visited Cincinnati, Hamilton, and Dayton. During the last seven years the Seniors have visited Chicago and its vicinity on the annual trip.

During the Spring term, four days are set apart for the Junior and six for the Senior trips. The experiences of these trips are considered to be among the most valuable of the engineer's collegiate life.

Schedule of Studies for the Degree Bachelor of Mechanical Engineering

YEAR	*First Hour.* 8-9 AM	*Second Hour.* 9-10 AM	*Third Hour.* 10:30-11:30 AM	*Fourth Hour* 11:30-12:30 AM	1:30-3:30 PM	3:30—4:30 PM	*Saturday* 9-12 AM	Term
FRESHMAN	English 3 Drawing 2	Trigonometry 5	Physics 2 Drawing 3	Chemistry 3 Drawing 2	Wood Shop Bench, Lathe	Drill Gym. 4:30-5:30	Wood Shop Drawing	I
	English 3 Drawing 2	Higher Algebra 5	Physics 3 Drawing 2	Chemistry 2 Drawing 3	Pattern Mak. & Foundry	Drill Gym. 4:30-5:30	Pattern Mak. & Drawing	II
	English 3 Drawing 2	Higher Algebra 5	Physics 3 Drawing 3	Chemistry 2 Drawing 3	Pattern Mak. & Foundry	Drill Gym. 4:30-5:30	Pattern Mak. & Drawing	III
SOPHOMORE	Analytical Geometry 5	Adv. Physics 3 Shop Practice 2	Elementary Design 5	Physical Lab. 5	Iron & Steel Forging	Drill Gym. 4:30-5:30	Elementary Design	I
	Analytical Geometry 5	Elec. & Mag. 3 Surveying 2	Calculus 5	Desc. Geom. 5	Machine Shop Work	Drill Gym. 4:30-5:30	Descriptive Geom. Draw.	II
	Analytical Geometry 5	Elec. & Mag. 3 Surveying 2	Calculus 5	Desc. Geom. 5	Machine Shop Work & Surveying	Drill Gym. 4:30-5:30	Descriptive Geom. Draw.	III
JUNIOR	Elementary Electricity 5	Mechanics of Materials 5	Calculus 5	Kinematics 5	Kinem. Draw. Chemical Lab.	Library	Testing of Materials	I
	Analytic Mechanics 5	Electrical Design 5	Chem. & Gas. Analysis 5	Mach. & Elec. Design 5	Machine Des.	Library	Flue Gas Analysis	II
	Graphical Statics	Dyn. & Mot. Design 5	Analytical Mechanics 5	Dyno. Ele. Machinery 5	Machine Des. Elec. Lab.	Library	Electrical Design	III
SENIOR	Thermodyn. 3 Hydraulics 2	History Logic 5	Altern. Curr. & 3 Dyn. Mot. Design. 2	Valve Gears & 3 Steam Boil. 2	Valve Des. & Elec Lab.	Library	Electrical Design	I
	Altern. Curr. & Power Plants 5	History Logic 5	Steam Eng. & 3 Pump Design 2	Dynamometer 2 Steam Turbi. 3	Valve & Dyn. & Mot. Des.	Library	Electrical Design	II
	Thesis 5	Thesis 5	Photography 1	Thesis 5	Thesis 5	Library	Thesis	III

Numbers give hours recitation per week. *2's Recite on Tuesdays and Thursdays.* *3's on Mondays, Wednesday and Fridays*

Entrance Requirements

An applicant for admission to the Freshman Class in any department of the University must present fifteen units as follows: English 3, Algebra 1-½, Plane and Solid Geometry 1-½, One Ancient or Modern Language 2, General or English History 1, Physics 1, and five additional units must be selected from the following list: Ancient or Modern Languages 3, Chemistry 1, Physical Geography ½, Geology ½, Astronomny ½, Physiology ½, Botany ½, Zoology ½, Civics ½, American History ½, Plane Trigonometry ½, Manual Training ½ and Drawing ½. A unit involves the pursuit of a subject for five hours a week for one school year of not less than thirty-four weeks. If the applicant can offer only 13 units he may be admitted, but these conditions must be removed before he can enter the Sophomore Class. Those who are prepared to pass a satisfactory examination in Spelling, Grammar, Arithmetic, Geography, and United States History may enter the Academy and if they are of sufficient age and maturity they may be admitted to any of the special courses.

EXPENSES.

The necessary expenses of the appointees are about as follows:

Washing	$20 00
Uniform	16 00
Books	25 00
Use of Furniture	2 50
Board—from $2.00 to $3.50 [per week].	

The additional expenses for those who are not appointees are about as follows:

Tuition in the Engineering Schools	$40 00
Tuition in College of Arts and Sciences	30 00
Tuition in College of Agriculture	25 00
Tuition in the Academy	20 00
Matriculation Fee	5 00
Gymnasium Fee	5 00
Laboratory Fee, each	5 00
Room-rent	45 00

A deposit fee of $10.00 will be required of all students. This takes the place of the various laboratory and other deposit fees heretofore charged and is returnable at the close of the year, less any damage assessment that may be charged up against it.

For other information, address,

F. PAUL ANDERSON, *Director*, Lexington, Ky.

ADMISSION.

All applicants for admission to the University or to the Academy should bring satisfactory testimonials of good moral character.

A student may be admitted to the University in one of four ways:

[a] By examination.
[b] By certificate from an accredited school.
[c] By transfer of credits from some other college or university.
[d] As a special student.

ADMISSION BY EXAMINATION.

Examinations for admission will be held at the University on September 2, 3, 4, 1909.

All persons who wish to enter the University for the Fall Term's work, except those whose entrance credits have been accepted by the Committee on Entrance, must take these examinations. They should present themselves at the office of the Committee on Entrance at 8:30 A. M. of Thursday, September second. They will then receive directions concerning the places at which the examinations will be held. For the hours of examinations, see schedule.

ADMISSION FROM ACCREDITED SCHOOLS, COLLEGES OR OTHER UNIVERSITIES.

Persons who desire to enter the University by credits instead of by examination must have these credits certified to by the proper official of the school in which they were secured. Blank forms for such certificates will be furnished by the Registrar of the University on application. These certificates should be sent as soon as possible to the Committee on Entrance. This committee will then notify the student that his credits are approved or that he must take entrance examinations in subjects for which his credits are not satisfactory.

ADMISSION AS A SPECIAL STUDENT.

A graduate of another university or college may enter the University to pursue any special work. Persons of maturity who for one reason or another have been out of school to such an extent that they are unable now to offer the fifteen units required for entrance to the Freshman class may be admitted as special students under the following conditions:

[a] They must be at least twenty-two years of age.
[b] They must show good reason for not taking a regular course.
[c] They must demonstrate their ability to do the work which they propose to undertake.

Students who have failed in their work, in either regular or special courses, will not be admitted as special students.

Young, immature persons will not be admitted as special students. County appointees are required by the terms of appointment to do full work in a regular course of study and cannot, therefore, be admitted as special students.

REQUIREMENTS FOR ADMISSION TO THE FRESHMAN CLASS.

Fifteen units, each requiring the pursuit of a subject for five hours a week for one school year of not less than thirty-four weeks, are required for admission to the Freshman Class in any College of the University.

Ten of these units must be as follows:

Algebra	1½
Geometry [Plane]	1
Geometry [Solid]	½
History	1
Language [English]	3
Language [One Ancient or Modern]	2
Physics	1

The remaining five units may be selected at will from the following subjects:

Astronomy	½
Botany	½
Chemistry	1
Civics	½
Drawing	½
History	1
History [American]	½
Language [Ancient or Modern]	3
Manual Training	½
Physical Geography	½
Physiology	½
Trigonometry	½
Zoology	½

Candidates for the degree of Bachelor of Arts must present five credits in Foreign Language, three of which must be in Latin.

No subject offered as an entrance requirement can be counted again in the total credits required for the completion of a college course.

DEFINITION OF UNITS IN THE SEVERAL SUBJECTS.

Mathematics

The units in Mathematics are as follows:

Algebra—One and one-half units. The work in Algebra to be acceptable must cover a full year in some good elementary text, such as Slaught and Lennes, Stone-Millis, Collins, Wentworth, Wells or Milne; and a full half-year in some more advanced text, such as Wentworth's Higher, Fisher and Schwatt's Higher, Well's Advanced, Hawke's Advanced, Milne's Advanced or Fine's College. *Preference should be given to the newer books which contain work on graphs.* The student must show a good knowledge of factoring, common divisors and multiples, fractions, involution embracing the binominal theorem for positive integral exponents, radicals, imaginary quantities, equations of the first and second degree involving one or more unknown quantities, equations solved like quadratics, simple indeterminate equations, and equations involving radicals, ratio and proportion, arithmetical and geometrical progressions. The student is expected to be able to state and explain the reason for every step in his work. The solution of problems by means of equations should be the chief aim in studying Algebra.

Geometry [Plane]—One Unit. The work in Plane Geometry to be acceptable must cover a full year in such a text as Beman and Smith, Wentworth, Milne, or Durell.

It is recommended that part of the year be spent upon the applications of Alegbra to Geometry and of Geometry to Algebra. The student should be able to apply the principles of Geometry to practical problems, to construct diagrams quickly and accurately. In proving a theorem or in solving a problem he should be able to prove every statement made by going back step by step till he reaches primary definitions and axioms.

Geometry [Solid]—One-half unit. The work in Solid Geometry to be acceptable must cover a full half-year. It is recommended that text-book work be accompanied by work of a semi-laboratory character, including the making of models of pasteboard or clay and experimental verification of the theorem by measuring, weighing, etc. Such laboratory methods will prove interesting and very helpful to the student.

Plane Trigonometry—One-half unit. The work in Plane Trigonometry to be acceptable must cover at least a full half-year in such a text as Crockett, Murray or Wentworth. The student must be familiar with and be able to use all the principal formulas, to find natural and logarithmic functions of angles of any magnitude, to construct triangles and other figures accurately and quickly. The daily use of inexpensive drawing instruments is recommended for students taking Geometry and Trigonometry.

Neatness should be required in all mathematical work.

HISTORY.

History [Required]—One unit. The work in history to be acceptable must cover one full year's work in the High School, during which the pupil should have practice in making reports on assigned topics. General History, based on Myers, will be accepted until September, 1911; but the University strongly advises the prompt adoption of one or more of the following courses instead of General History:

Ancient History [to 800 A. D.] as presented in such texts as West's Ancient World, Myers' Revised Ancient History, or Goodspeed's History of the Ancient World.

English History, as given by Cheyney's Short History of England, Walker's Essentials, or Wrong's British Nation.

Mediaeval and Modern History, equivalent to West's Modern History which emphasizes the nineteenth century.

History and Civics **[Elective]**—Two units. American History and Civil Government [Civics]—one-half unit each—should be pursued in the last year of the High School, each serving to illustrate the other. In Civil Government the pupil should know the relations and functions of the county, city, state and national governments.

In addition to this unit, the candidate may offer one elective unit from the required courses described above.

ENGLISH.

The three units that must be offered in English are these:

Advanced Grammar. First Year. One unit.

Rhetoric and Composition. Second Year. One unit.

Reading and Practice. Third Year. One-half unit. For 1909 and 1910 the books prescribed are these: Shakespeare's The Merchant of Venice and Macbeth; Addison's Sir Roger de Coverley papers; Irving's Life of Goldsmith; Coleridge's Ancient Mariner; Scott's Ivanhoe and Lady of the Lake; Tennyson's Gareth and Lynette, Lancelot and Elaine, the Passing of Arthur; Lowell's Vision of Sir Launfal; George Eliot's Silas Marner.

Study and Practice. Third Year. One-half unit. Preparation includes the thorough study of each of the works named below; a knowledge of the subject matter, form and structure. In addition, the candidate may be required to answer questions involving the essentials of English grammar, and questions on the leading facts in those periods of English history to which the prescribed works belong. For 1909-10

set for this part of the work are these: Shakespeare's Julius
ton's Lycidas, Comus, L'Allegro and Il Penseroso; Burke's
onciliation with the Colonies; Macaulay's Essays on Addi-
e of Johnson.
ils have had daily or weekly exercises in Composition
writing throughout the three or four years of their High
riculum, their work in Grammar, Rhetoric, and Literature
oe accepted as equal to three units in English.

LANGUAGES.

Latin. Persons who expect to be candidates for the degree of Bachelor of Arts must offer at entrance three units of Latin as follows:

Latin A. Grammar and Composition. One unit. Moore's Grammar, or its equivalent, with a daily exercise in inflection and in translation from and into Latin on the blackboard; easy Latin readings

Latin B. Nepos and Caesar. One unit. Twelve Lives of Nepos and four books of Caesar, or Second Year Latin; Daniell's New Latin Composition.

Latin C. One unit. Four books of Virgil or twenty-five hundred lines of Ovid, with scanning; seven orations of Cicero.

Latin A and B may be offered as the two units of a foreign language required to enter courses in the University other than those leading to the degree of Bachelor of Arts.

Greek. To offer two units in Greek applicant must have completed:

Greek A. One unit. White's Beginner's Greek Book [or its equivalent], involving quantity, accentuation, declensions, genders, conjunctions, syntax and idioms.

Greek B. One unit. Four books of Xenophon's Anabasis; six books of the Iliad, and Gleason's exercises in Greek prose composition.

German. In order that a two-years' course in German should be accepted for two units it should comprise:

Grammar and Translation. One unit. A thorough drill in and an elementary knowledge of the gender of nouns and declension of nouns and adjectives; the demonstrative, relative and interrogative pronouns; the normal, inverted and transposed order; the ability to write German script legibly and readily under dictation; to translate with comparative ease elementary German into English, and *vice versa*; familiarity with the strong and weak conjunctions of the commonest verbs.

Composition and Reading. One unit. Advanced German Grammar; composition; the reading of about two hundred pages of German prose of medium difficulty; the reading of some of the easier German lyrics.

French. A two years' course in French, equivalent to the two years' course in German just outlined, will be accepted in lieu of th latter.

NATURAL SCIENCES.

Chemistry. One unit. To be accepted, Chemistry must have been studied for one school year, and should have rendered the student familiar with the following topics in non-metallic chemistry: Properties of the principal acid-forming elements and their compounds; simple problems on relations by weight; relations between gas volumes and the weights of chemically related solids; acids, bases and salts, valence; series of oxy-acids and their salts; oxidation and reduction; acid anhydrides; hydrates and polyacids.

Physics. One unit. The work in Physics to be acceptable must cover a full year in a text book not lower than Gage's Elements. The text book used must contain many problems illustrative of the principles of the text, and the student must be able to handle these problems well. It is recommended that the student shall also have done forty or more experiments of a quantitative character.

In Science new facts are being discovered almost daily. Text-books on these subjects should be up-to-date. To be accepted as possessing one-half unit value, each of the following elective subjects must have been pursued for at least one-half of the school year.

Astronomy. In Astronomy the student should have learned the elementary facts regarding the earth and other members of the solar system as to their sizes, distances and motions around the sun, how the moon causes our tides, what causes the change of seasons, methods of reckoning time, the causes of eclipses, etc. The laboratory methods of studying this subject suggested by Todd's Astronomy and Laboratory Manual of Astronomy by Mary E. Byrd are strongly recommended.

Botany. Should involve a knowledge of the Structure and Elementary Physiology of the Seed Plants as presented in Bergen's Elements, chapters one to twenty-two inclusive; Bailey's Elementary Text-book of Botany, chapters one to twenty-four inclusive, and twenty-six to thirty inclusive, or their equivalent. The laboratory method of instruction, as suggested by these works, should be emphasized. It is not required or expected that the student should have studied the minute anatomy of these plants farther than it can be done with the simple magnifier, although it is highly desirable that the teacher should have a compound microscope available for purposes of demonstration to the class, of cell structure, stomata, etc., etc. It is important that a student should have some acquaintance with the principles of classification, and desirable, though not indispensable, that he should have some knowledge of the determination of species.

Physical Geography.—In the study of Physical Geography the student should have acquired an elementary knowledge of relief forms of the continents and islands, continental drainage, ocean currents, winds, causes of storms, moisture of the air, hail, snow, relations between plants and animals and the range of each, range of human habitations, and the influence of physical geography on man and on the industries of a country. Acceptable texts on this subject are by Dryer, Brigham and Gilbert, Davis, and Tarr.

Physiology.—One-half unit. The preparation in this subject should include instruction in anatomy, physiology, histology and hygiene. The amount expected is indicated by that given in Martin's The Human Body, Briefer Course; Overton's Advanced Physiology, Blaisdell's Practical Physiology, or any text-book of similar scope. This would include something of the bones, organs of circulation, digestion, respiration and excretion; the nervous system and special senses; and a study of the essential facts of digestion, absorption, secretion, excretion, circulation, respiration, etc.

The text-book work should be illustrated by models, charts, drawings with chalk and specimens. A note-book with drawing and explanations should be required.

Zoology. Should be such as would render the student familiar with the salient characteristics of each of the animal sub-kingdoms. This can only be accomplished by a laboratory study of at least one type animal under each sub-kingdom.

MANUAL TRAINING AND DRAWING.

Manual Training. One-half unit. The student should be familiar with the usual shop processes and methods of work, and the properties of the materials ordinarily used in constructions. Not less than one hundred hours should be devoted to such exercises in woodwork as are given in Goss's Bench Work in Wood and Golden's Wood Turning.

Drawing. One-half unit. The student should be able to show ability to sketch freehand geometrical figures such as circles, spirals, polygons, pyramids and cylinders; also common objects such as chairs, tables, animals, bones and flowers. He should also be able to copy by enlarging or reducing its dimensions the picture of any ordinary object.

ENTRANCE CREDIT CARDS.

Graduates of accredited schools who desire to enter the Universty without examination, must present from their Superintendent or Principal "Entrance Credit Cards," setting forth the number of units each is prepared to offer. These cards will be furnished to heads of schools on application. In no instance will a pupil be admitted to the University in any subject without examination unless specifically vouched for in this way. A list of those to whom such cards have been issued, with the course of study in the University each proposes to pursue, should be in the hands of the Chairman of the Accredited Schools Committee not later than June 15 of each year.

If a student is not able to offer all of the fifteen units req entrance, he will be required to make up his deficiency in th sity Academy or under a tutor. He will be allowed to take studies which do not interfere with his preparatory work, b not be registered as a Freshman until he has made up all ficiencies.

ADVANCED STANDING.

After being admitted to the University, a student may se vanced standing:

[a] By examination on each subject for which he desires cr

[b] By transfer, from a college or university, of credits satisfacto to the Professors concerned.

No student will under any circumstances be accredited beyond th Junior year.

ACCREDITED SCHOOLS.

Schools, whether public or private, may be accredited in whole or in part. To be fully accredited, a school must present to the Committee on Accredited Schools satisfactory evidence that it is able to meet the entrance requirements of the University as stated on pages twenty-six to thirty-three inclusive. This will require that four years of competent high school instruction shall be given.

A school giving thorough but less extensive preparation may be accredited in special subjects.

Printed forms will, on application, be sent to the heads of schools who may desire to have their schools placed in the accredited list. These forms must be filled out and, with an announcement of the course or courses of study given in the school, be sent to the Committee on Accredited Schools at the University.

The list of accredited schools [in process of revision as this catalogue goes to press] will be mailed on application.

The Board of Trustees of the University has authorized the President to make an annual award of a free scholarship to the pupil in each fully accredited school, who has completed, with the highest grade, the full course in that school. This scholarship entitles the recipient to free tuition. If, in addition, the holder of the scholarship obtains a county appointment, he is entitled to a room in one of the dormitories and to his traveling expenses.

REGISTRATION.

Registration of New Students.—New students seeking admission to the University for the Fall Term's work must present themselves to the Committee on Entrance between 8 A. M., Thursday, September 2, and 10 A. M. Monday, September 6. Students whose entrance credits have not been accepted should present themselves as soon as possible after 8 A. M. September 2. From the Committee on Entrance the student will receive a card certifying the extent of his or her entrance credits to the President of the University.

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